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EXAMINER	
DEPPE, BETSY LEE	
ART UNIT	**PAPER NUMBER**
2634	3

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/726,533	Applicant(s) MATSUNAGA ET AL.	
	Examiner Betsy L. Deppe	Art Unit 2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-18 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-18 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 01 December 2000 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. According to page 1, lines 13-19, Figure 10 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

3. The claims are objected to because of the following informalities:

on line 4 of claims 1, 3 and 5, "previously" or "prior" should be inserted before "received" and on line 5 of claims 1, 3 and 5, "before" should be deleted for improved readability. These changes should also be made to the appropriate lines in the other independent claims.

in claim 1, line 12, "a" should be inserted before "Viterbi". This change should also be made to the appropriate lines in the other independent claims.

in claim 1, line 15, "a" should be inserted before "survival". This change should also be made to the appropriate lines in the other independent claims.

on line 4 of claims 3 and 5, "Where" should be "where". This change should also be made to the appropriate lines in the other independent claims.

in claim 3, line 18, "the power" should be "the ***detected*** power". This change should also be made to the appropriate lines in the other independent claims.

in claims 5, 11, 12, 17, and 18, "ρ" is not defined;

in claim 8, "an interleaving unit which interleaves" on line 18 should be "a deinterleaving unit which deinterleaves" and on line 22, "interleaving" should be "deinterleaving" (see Figure 8B). These changes should also be made to the appropriate lines in claims 10, 12, 14, 16, and 18; and

in claim 8, line 19, "a predetermined algorithm" should be "***the*** predetermined algorithm". This change should also be made to the appropriate lines in claims 10, 12, 14, 16, and 18.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 2, 4 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation recited in claim 2, lines 6-12, claim 4,

lines 6-13 and claim 6, lines 6-14, respectively, is difficult to understand because it is grammatically awkward. It is unclear what difference is being determined and how it relates to the hard decision data. For example, how is this difference affected by "inverting the hard decision data" and how does the difference relate to the reliability information of the hard decision data. Furthermore, "minimum/maximum" renders the respective claims vague and indefinite because it is unclear whether the minimum or maximum path metric is used.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in Figure 10 of the present application in view of Blasiak et al. (US Patent No. 5,706,313) and Nagayasu (US Patent No. 5,844,946). Figure 10 in the present application discloses the claimed invention except for the soft decision demodulated data estimating unit that estimates soft decision demodulated data based on a survival path metric and a decoding unit for decoding based on the soft decision demodulated data. (See page 3, line 11 – page 7, line 22)

Figure 2 of Blasiak et al. discloses using a soft decision demodulated data estimating unit (201) and a decoding unit for decoding based on the soft decision

demodulated data in a differential phase shift keying demodulator. (See column 3, line 18 - column 5, line 55) It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the Viterbi sequence estimation unit for generating a hard decision in the admitted prior art in Figure 10 with a soft decision demodulated data estimating unit as disclosed by Blasiak et al. in order to improve the bit error rate performance of the demodulator. (See Blasiak et al. column 2, lines 52-58)

However, the admitted prior art in Figure 10 of the present invention in view of Blasiak et al. does not teach estimating the soft decision demodulated data based on survival path metrics. Nagayasu teaches using survivor path metrics to produce a soft-decision value. (See abstract and column 10, lines 40-60). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use survival path metrics in the soft decision demodulated data estimating unit of the circuit disclosed by Figure 10 of the present invention in view of Blasiak et al. in order to simplify the circuit and process of estimating the soft-decision demodulated data.

8. Claims 3, 5, 9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in Figure 10 of the present application in view of Blasiak et al., Nagayasu, and Nagayasu et al. (US Patent No. 6,269,124 B1). Figure 10 in the present application discloses the claimed invention except for a soft decision demodulated data estimating unit that estimates soft decision demodulated data based on a survival path metric, a power detection unit, a ρ-multiplying unit, and a decoding

unit for decoding based on the soft decision demodulated data. (See page 3, line 11 – page 7, line 22)

Figure 2 of Blasiak et al. discloses using a soft decision demodulated data estimating unit (201) and a decoding unit for decoding based on the soft decision demodulated data in a differential phase shift keying demodulator. (See column 3, line 18 - column 5, line 55) It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the Viterbi sequence estimation unit for generating a hard decision with a soft decision demodulated data estimating unit as disclosed by Blasiak et al. in order to improve the bit error rate performance of the demodulator. (See Blasiak et al. column 2, lines 52-58)

However, Figure 10 of the present invention in view of Blasiak et al. does not teach estimating the soft decision demodulated data based on survival path metrics. Nagayasu teaches using survivor path metrics to produce a soft-decision value. (See abstract and column 10, lines 40-60.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to use survival path metrics in the soft decision demodulated data estimating unit of the circuit disclosed by Figure 10 of the present invention in view of Blasiak et al. in order to simplify the circuit and process of estimating the soft-decision demodulated data.

However, the admitted prior art in Figure 10 of the present invention in view of Blasiak et al. and Nagayasu does not disclose a power detection unit and a ρ-multiplying unit wherein the results of these units are used by the soft decision demodulated data estimating unit. Figures 4 and 7 of Nagayasu et al. teaches using a

power detection unit and a ρ-multiplying unit wherein the results of these units are used by the soft decision demodulated data estimating unit. (See column 7, lines 10-24 and column 7, line 66 – column 8, line 4) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the teaching of Nagayasu et al. into the circuit disclosed by the admitted prior art in Figure 10 of the present invention in view of Blasiak et al. and Nagayasu in order to further improve the bit error performance of the receiver.

9. Claims 2, 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references applied to claims 1, 3, and 5, respectively, above, and further in view of Dent et al. (US Patent No. 5,335,250). The combination of references cited in the respective rejections above includes the hard decision data limitation on lines 3-5 (see page 7, lines 17-18 in the present application). However, the references do not disclose determining a difference between a survival path metric and one that transits into another state and generating the soft decision demodulated data according to the hard decision data and the reliability information.

Dent et al. discloses a soft information generating method that includes determining a difference and generating the soft decision demodulated data according to the hard decision data and the reliability information. (See column 10, lines 19-27) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement these steps into the circuit disclosed by the respective combination of references.

10. Claims 8, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakoda et al. (US Patent No. 6,574,283 B1) in view of the admitted prior art in Figure 10 in the present application, Blasiak et al. and Nagayasu. Figures 2a and 3a disclose the claimed invention except for a receiver having a multiple differential phase detected signal output unit and a soft decision demodulated data estimating unit. (See column 1, line 48 – column 3, line 30)

As explained in the rejection of claims 1 and 7 in paragraph 7 above, the combination of the admitted prior art in Figure 10 in the present application, Blasiak et al. and Nagayasu discloses the recited multiple differential phase detected signal output unit and the soft decision demodulated data estimating unit. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the circuit disclosed by the combination of the admitted art in Figure 10 in the present application, Blasiak et al. and Nagayasu in the DQPSK demodulation circuit (13) in Sakoda et al. in order to improve the bit error rate performance of the DQPSK system by using soft decision demodulation.

11. Claims 10, 12 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakoda et al. in view of the admitted prior art in Figure 10 in the present application, Blasiak et al., Nagayasu and Nagayasu et al. Figures 2a and 3a disclose the claimed invention except for a receiver having a multiple differential phase detected signal output unit and the soft decision demodulated data estimating unit

wherein the soft decision demodulated data estimating unit that estimates soft decision demodulated data based on a survival path metric, a power detection unit, a ρ-multiplying unit, and a decoding unit for decoding based on the soft decision demodulated data. (See column 1, line 48 – column 3, line 30)

As explained in the rejection of claims 3 and 5 in paragraph 8 above, the combination of the admitted prior art in Figure 10 in the present application, Blasiak et al., Nagayasu and Nagayasu et al. discloses the recited multiple differential phase detected signal output unit and the soft decision demodulated data estimating unit wherein the soft decision demodulated data estimating unit that estimates soft decision demodulated data based on a survival path metric, a power detection unit, a ρ-multiplying unit, and a decoding unit for decoding based on the soft decision demodulated data. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the circuit disclosed by the combination of the admitted art in Figure 10 in the present application, Blasiak et al., Nagayasu and Nagayasu et al. in the DQPSK demodulation circuit (13) in Sakoda et al. in order to improve the bit error rate performance of the DQPSK system by using soft decision demodulation.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Betsy L. Deppe whose telephone number is (703) 305-4960. The examiner can normally be reached on Monday-Wednesday (8:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (703) 305-4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Betsy L. Deppe
Primary Examiner
Art Unit 2634